Space Weather Forecast

Issued on Tuesday, 05 September 2023 at 13:02 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of R1 Minor Radio Blackouts throughout, increased from midweek UTC. Probable peak slight chance of G1 Minor Geomagnetic Storm in current UTC day, however possible CME awaiting analysis.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity rose to Moderate in the past 24 hours, with a Moderate-class X-ray flare recorded from a sunspot region near the middle of the Sun at 05/0812UTC. This was followed by a smaller Common-class flare from a possible new arriving region over the northeastern solar horizon. There are now up to eight sunspot groups on the facing side of the Sun. Of these, the group responsible for the peak flare showed a spreading tendency, with some development of intermediate spots, shear and some polarity mixing, mostly signs of increasing instability. A second spot group in the northeast showed rapid growth, with multiple spots emerging, although the narrow viewing angle is hampering analysis.

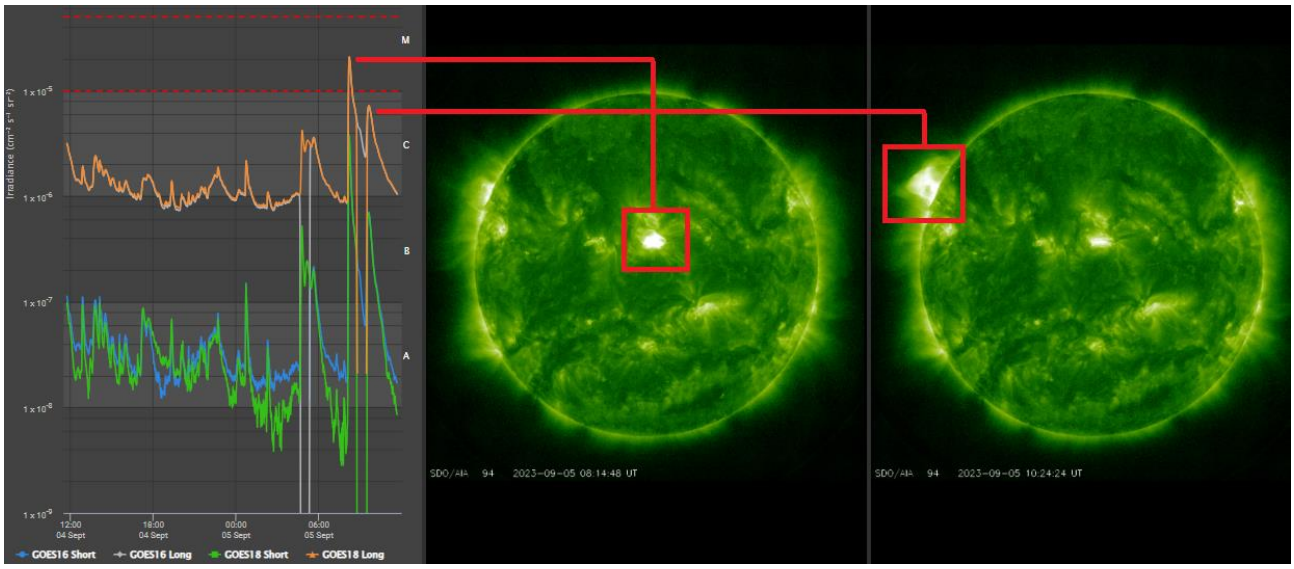

Figure 1: X-ray trace showing the largest X-ray flare events of the period and their source locations. The aftermath of the larger of the two events may yet reveal a CME, however there remains no clear evidence as of the time of issue of this guidance document.

There was a Coronal Mass Ejection (CME) seen leaving the southeast at 04/1330UTC. This event has been modelled, and the bulk of ejecta appear to miss, with perhaps some very minor contribution from the CME shock possible in the UTC day 07 into 08 September. The peak flare of the period may yet prove to have been accompanied by a second CME, with this much more likely to have an Earth-directed component should it materialise. Tentatively then, there are no significant new CMEs

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Solar Wind / Geomagnetic Activity: The solar wind environment was indicative of the cessation of the fast wind from a coronal hole, with speeds reducing from slightly elevated into background. The number of particles in the solar wind showed a level trend within the long term background, while their associated magnetic field was smooth and within its typical range, as the north-south component was neither strongly co- or anti-aligned (with Earth's field).

The net result of the above solar measures was for provisionally quiet geomagnetic activity throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: There is a daily Chance of Moderate-class flares that increases slightly from midweek with the arrival of a returning active region, coupled with the increased complexity of the largest front-sided sunspot group.

Solar Wind / Geomagnetic Activity: There are numerous aspects to the geomagnetic forecast, but the main watch point is whether any CME resulted from the Moderate-class X-ray flare of the current UTC day. This excepted, the forecast is of a peak slight chance of Minor Geomagnetic Storm G1 within the current UTC day from a coronal hole fast wind and perhaps a glance from the 01 September CME. Activity should then reduce later in the UTC working week.

Energetic Particles / Solar Radiation: No solar radiation storms are expected.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	5	5	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	Yes	30	40	40	40
Very Active	R3 to R5 X	No	1	2	2	2

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	2	2	2	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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